REMARKS

Claims 1 and 4-20 are currently pending in the current application, of which claims 14-20 have been added. Adequate written descriptive support for claims 14-20 can be found throughout the detailed specification including the original claims. For example, claim 14 contains the same language as original claim 1 except it recites only that the water repellency varies in a plane direction. Claims 15-20 correspond to original claims 9-13. Accordingly, it is respectfully submitted that this Amendment does not create any new matter issues.

Claims 5 and 7-13 were objected to under 37 CFR 1.75(c) as being in improper dependent form. Applicant has amended these claims to delete their multiple dependency. Accordingly, reconsideration and withdrawal of this objection are respectfully solicited.

Claims 4 and 6 were rejected under 35 USC §102(e) as being anticipated by U.S. Patent No. 5,500,292 to Muranaka et al. (Muranaka). The rejection is traversed and is respectfully submitted that Muranaka does not anticipate claims 4 and 6.

Independent claim 4 relates to a polymer electrolyte fuel cell. The claim requires, at a minimum, that the water repellency of the cathode is higher than the water repellency of the anode of the cell.

Muranaka does not inherently or expressly teach at least this feature. Muranaka teaches that the water repellency of an electrode can be formed with a concentration gradient. Muranaka teaches forming a concentration gradient by forming multiple hydrophobic layers with various concentrations of catalysts, carrier, water repellent and ionic conductor adjacent one another. This arrangement is shown in Figs. 5, 7 and 8 of Muranaka. However, it does not logically follow that because one electrode has a concentration gradient for water repellency that it necessarily has a higher water repellency than an electrode that does not have such a

concentration gradient. *Continental Can Co. v. Monsanto Co.*, 948 F.2d 1264 (Fed. Cir. 1991)(The standard for inherency is that the thing suggested to be inherent must **necessarily** result from the given circumstances, and that one of ordinary skill in the art would have been aware of such result.)

Indeed, Muranaka teaches in the examples that the overall water repellency of the cathode electrode is less than the anode electrode. Examples 1 and 2 include two layers (72 and 73; 92 and 73, respectively) for the cathode electrode. The water repellency of these electrodes is dependent upon the concentration of PTFE, as disclosed in column 9, lines 17-21 of Muranaka. As shown in Table 1 and Table 2, the cathode electrode including layer 73 and 72 has less PTFE than the anode electrode 74. In particular, the amount of PTFE in layers 73 and 72 is 1.31 (0.46+ 0.85= 1.31). This amount (1.31) of PTFE for cathode layers 73 and 72 is less than the 1.5 amount of PTFE for anode electrode 74. The same is shown for example 2 where electrode layer 73 and 92 have 1.31 PTFE whereas anode electrode 74 has 1.5 PTFE. Thus, not only does Muranaka fail to inherently teach that a cathode electrode has a higher water repellency than an anode electrode of a fuel cell – it expressly teaches the opposite.

In the Office Action, it was also argued that since Muranaka employs a cathode comprising multiple layers, it would inherently follow that the cathode would have 1.2 to 2.0 times the gas permeability of the conductive porous base material in the anode. Applicant respectfully submits that there is no evidence of such inherency in Muranaka. Accordingly, reconsideration and withdrawal of the rejections of claims 4 and 6 predicated on Muranaka are respectfully solicited.

Claim 1 was rejected under 35 USC §103(a) as being unpatentable over Muranaka in view of U.S. Patent No. 6,218,035 to Fuglevand et al. (Fuglevand). The rejection is traversed and it is respectfully submitted that claims 1 and 4-20 are patentable within the meaning of 35 USC §103.

Claim 1 relates to a polymer electrolyte fuel cell. The claim requires that water repellency of at least one of the cathode and the anode vary in a direction of thickness or in a plane direction. With respect to the water repellency varying in a thickness direction, claim 1 further requires that the water repellency is higher on the side of the conductive separator plate than on the side of the hydrogen ion-conductive polymer electrode membrane.

Muranaka and Fuglevand do not teach or suggest a fuel cell in which the water repellency of either a cathode or an anode varies in a plane direction, as recited by independent claims 1 and 14. Further, the combination of these cited references do not teach varying the water repellency of either a cathode or an anode where the water repellency is higher on the side of the conductive separator plate than the membrane.

Indeed, Muranaka teaches the opposite of this structure. Muranaka specifically teaches that the water repellency is highest in the area adjacent to the membrane and lowest in the area adjacent to the conductor. (See e.g. abstract of Muranaka). This is also shown in Figs. 5, 7 and 8.

Fuglevand does not cure this deficiency. Fuglevand describes the separator layers, not the electrodes as being variable in their hydrophobicity. There is no realistic reason why one of ordinary skill in the art would have been motivated to go against the precise teaching of Muranaka simply because Fuglevand shows another part of the cell having a different hydrophobic gradient direction.

In the Office Action, it was asserted that the invention of claim 1 as a whole would be obvious because Fuglevand teaches that the direction of hydrophobicity may be reversed depending on the performance characteristics desired for the membrane electrode diffusion assembly. The Examiner further asserted that the skilled artisan may be motivated to change the orientation of the hydrophobic gradient to control the direction of moisture in the fuel cell. Applicant respectfully disagrees with these conclusions for several reasons. First, motivation is not something one of ordinary skill in the art may do, motivation is defined as what one of ordinary skill in the art at the time would do given the particular teachings of the cited references. Given their teaching, one of ordinary skill in the art would be motivated to provide a hydrophobic gradient for an electrode where the water repellency is greater at the membrane side than the conductor side because that is precisely what Muranaka teaches in his patent as being advantageous.

Indeed, the combination suggested by the Examiner would change the principle operation of the primary reference, Muranaka. Thus, motivation cannot be established by such a combination. *In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984)(If the proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification.); M.P.E.P. § 2143.01.

Based on the foregoing, it is respectfully submitted that claims 1-14 are in condition for allowance. Favorable consideration and allowance of the application are respectfully solicited.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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